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A STATEMENT BY THE TECHNICAL MEMBERS OF THE KRISHNA-RAJASAGARA COMMITTEE IN REGARD TO CERTAIN CRITICISMS ON THE KRISHNARAJASAGARA SCHEME.

Certain rambling criticisms on the Krishnarajasagara Scheme relating practically to the same points as before are again appearing in several papers in spite of the misleading nature of the views having been pointed out by Government on the previous occasion. The undersigned technical officers of the Krishnarajasagara Committee recently appointed have thought it fit to publish the following statement giving a general description of the scheme in all its aspects with a view to clear the misapprehensions arising from the unfair criticisms.

2. The Krishnarajasagara scheme was taken up with a view to provide facilities for development of power as well as irrigation. Before the reservoir came into existence, the Cauvery Falls had been harnessed to generate electric power to the extent of about 11,000 H.P. The river supply fell below the requirements of even this quantity of power in the summer months and temporary arrangements costing Rs. 50,000 nearly every year were being made at the existing anicuts to provide the supply required for power generation during periods of low discharge in the river. Hence arose the necessity for the construction of a reservoir.

It is stated in the criticisms that the construction of a large reservoir for power was a waste and that the necessary protection to the power scheme could have been arranged by continuing the old storage arrangement at certain anicuts by sand bags and that, if at all a reservoir was considered necessary, one costing Rs. 3 or 4 lakhs could have sufficed on the Tunga or the Kapila or the Suvarnavathi. Nothing could be farther from the truth. The Tunga river is in the Shimoga District in a different valley and is of no use for Sivasamudram Works. There is not sufficient water in the Suvarnavathi for the requisite storage as recent investigations have confirmed. In fact, even the existing tanks in this valley which have preferential claims did not fill during the last two years. Every possible site in the Cauvery Valley has been examined and any reservoir capable of storing about 7,000 Mcft. which is the requirement for power provided in the project would cost Rs. 80 to 100 lakhs according to the rates at which Krishnarajasagara works have been executed. The correspondent probably thinks that generation of power on the scale on which it is being done now is unnecessary as after the Mines begin to relinquish power, no other demand is likely to arise for it. He seems to be unaware of the fact that of the gross revenue of about Rs. 44 lakhs for power, Bangalore and Mysore and other private concerns alone are now contributing about Rs. 19·3 lakhs and that there are very reasonable grounds for entertaining the belief that the two Cities and the Towns near the transmission line are likely to absorb a good deal of the power available when the Mines play out. However, there seems to be no ground for entertaining any fear about the Mines for some time to come, and even then they are likely to relinquish power only gradually.

3. Thus, as the reservoir required for even power purposes had to be large, the ideal kept in view from the time investigations were commenced by Captain Dawes has been to construct one for both power and irrigation. Captain Dawes' scheme was even more ambitious for irrigation than the later Krishnarajasagara Scheme. A brief review in regard to irrigation will show that this ideal was really the right one.

4. The extent of irrigation in the Cauvery Valley in the Mysore State before the construction of the reservoir was about 110,000 acres which comprise narrow strips of land hugging the rivers. The perennial flow of the river is fully exploited by the series of anicuts from the upper to the lower boundary of the State and no further extension of irrigation is possible in Mysore by the construction of more anicuts.

5. The Cauvery irrigates nearly 11 lakhs of acres in the Tanjore delta while the corresponding area in the State is now only about 1·3 lakhs, which shows to what small extent the river has been made use of in Mysore. At the time the construction of Krishnarajasagara was under consideration, Madras had fully investigated the Metur Scheme for a gigantic reservoir both to protect their existing irrigation of 11 lakhs of acres and to further extend irrigation by about 3·30 lakhs of acres.

6. As regards the general state of irrigation in Mysore, the tank system has been almost fully exploited. Of course, very strenuous and sustained efforts are necessary for the restoration and repairs of tanks to maintain them in a state of efficiency and to conserve the existing revenue, but not much material increase of area for new irrigation under them is

possible. There are only two large river systems in the State, *viz.*, the Cauvery Valley and the Bhadra and Tunga Valley where any large extension of irrigation is possible at all and even such extensions can be carried out only by the construction of costly reservoirs or other similar works as practically all cheap schemes have been fully carried out.

7. As the Cauvery and its tributaries bring in enormous floods during the monsoon period, the construction of a dam in this valley had, for a long time, been under investigation in Mysore. The insufficiency of supplies for power generation at Sivasamudram and the fact that Madras were seriously considering the construction of the Metur Reservoir to utilise almost fully the floods in the river afforded the necessary stimulus for seriously considering the construction of a Reservoir in Mysore in this valley. It was felt that if the construction of the Metur Reservoir became an accomplished fact, any extension of irrigation in Mysore in the Cauvery Valley would be seriously jeopardised. Here is an extract from a memorandum dated 2nd May 1908 by Mr. Mc. Hutchin, Chief Engineer, on Captain Dawes' Scheme for a reservoir on the Cauvery showing that this was also his view. "I think the point brought to the notice of Government in section 12 of the report is of very great importance to Mysore; it is almost an absolute necessity that Government should in the near future secure the rights to a fair share of the supply in the reservoir for the development of the irrigation in the State." He also adds in another part of the note that "it is now proposed to gradually carry out the construction of the channel for irrigation out of the revenue derived from the sale of electric power, etc.," showing his proposals for financing the irrigation scheme. Sir John Benton, Inspector-General for Irrigation to the Government of India, remarks in his Note dated 12th May 1911 on this project as follows:—"It appears to me that the cultivation of wide tracts for supplies of food stuffs for the people stands on a higher plane than Gold Mining which is advanced for the enrichment of the Companies and the increase of royalties." It was therefore the prospect of meeting the demand for additional power by the Mining Companies and the desirability of not losing the Mysore rights for a share in the river supplies for irrigation (which in this case is expected to be also remunerative) that resulted in the construction of the large Krishnarajasagara Reservoir.

8. Considering the fact that agriculture is the main industry of the people of India and any measure taken to stabilise this industry is of great importance to the welfare of the people, there is ample justification for the combined scheme having been undertaken in the interest of irrigation, which is so vitally connected with the permanent welfare of the country.

9. That Mysore has no time to lose in taking energetic steps immediately in the direction of irrigation development is obvious. The agreement with Madras confers the right to bring under irrigation an additional area of 250,000 acres in the Cauvery Valley and the time available for the purpose according to the agreement is limited. Madras is making energetic efforts to push on with the Metur Project and to take up the Bhavani Scheme and if Mysore is found to lag behind in utilising fully the rights provided in the agreement, the risk of losing the rights for a further share in the river supplies will be very great to Mysore, when the time arrives for the revision of the agreement.

10. It may be stated here that the anonymous correspondent is quite in error in thinking the statement made in the Government Order that the storage at 106 in the reservoir is sufficient for irrigating over 60,000 acres is 'demonstrably false.' Working Tables show that as much water as will fill the reservoir even three times can be drawn off in a good year and about one and a quarter times in all ordinary years. The assumption in the criticism that the water available is equal only to the storage capacity overlooks the fact that a reservoir can fill several times as water is drawn off. In fact, the present storage capacity is enough even to irrigate the full contemplated area in very good years, and it is only to carry forward the storage of good years to a bad year that the capacity was increased to 124 level. The remarks as regards the VII Installation for power are also incorrect; Government have taken up this as a temporary installation only to use water lying idle, and it is not intended to take away any supplies for it permanently.

11. The remarks in the foregoing paras apply to the aspects of the scheme of combining irrigation and power which is not done with the object of showing the return for irrigation in a better light but because the capital expenditure on the combined scheme will be paying interest charges and at the same time leaving a surplus at all stages including that of irrigation development showing that financing the irrigation scheme will not be difficult to Government. This point is well exhibited in the financial statement given in pages 45 to 48 of G. O. No. 115-26—K. S. S. 723-34 dated 1st September 1924. It will be shown now that anticipations regarding irrigation are in no way unduly optimistic as made out in the criticisms.

12. The main criticisms of the scheme by the correspondent are directed against the duties assumed for irrigation. The contention is that very high and unreliable duties of water for irrigation have been assumed and that anticipations in this connection are highly inflated. This question will now be examined.

13. The duties provided were discussed in detail during the Arbitration and the Assessor (the late Sir M. Nethersole) has recorded his considered opinion that it is practicable to realise them and Madras also concurred in them after discussion during Arbitration. Further, similar and much higher duties (*i.e.*, the minimum during period of maximum demand being 70, the maximum 297, the average working out to about 120, page 13, Volume IV, Metur Project Report) are provided in connection with the Metur Project and the commanded area in both cases has many points of resemblance and they are quite unlike the narrow strips under the existing channels to which frequent comparisons are made in the criticisms under consideration. Further, Sir, M. Visvesvaraya Mr. Karpur Shrinivasa Rao, Mr. Cadambi, (who have had experience of Canal Irrigation in Mysore and in British India) and other Engineers who have had anything to do with the scheme in detail have agreed to the duties provided, and no Engineer whose opinion counts has yet criticised them adversely. Thus, the weight of professional opinon is in favour of the duties provided. The question will now be examined on its merits also.

14. The duties actually realised in the State will be considered under (1) the existing channels in the Cauvery Valley which irrigate about 130,000 acres in all, and (2) tanks in Maidan Taluks which irrigate about 500,000 acres and use storage water.

15. The duties under the channels in the Cauvery valley vary from 20 to 30, 40 and even more being realised in several localities. Recent examination shows that the *average* duty for the *whole period* of irrigation works out to 27 to 30, (it is even as high as 39 in the case of Ramaswamy Channel) and not to 20½ as assumed in the newspaper criticisms. What is really happening under these channels is that only a small percentage of the water taken is utilised by the crop and the rest flows over the land to the river, the waste being enormous. The causes of such low duties under these channels should be obvious to any one who has any experience of the matter. The pipe sluices in all the old channels have been fixed in an indiscriminate manner and the duties vary from even 9 to 25, 30, 40, etc. In fact no serious attempts have been made to systematise and control irrigation under the channels as there was abundance of supplies and good arrangements for regulation and control involved expenditure not worth incurring under the then circumstances. Further the areas irrigated consist of narrow strips of broken country hugging the river bank with steep slopes and porous soil. The distance of the channel from the river is small and there is hardly any means of picking up and reusing the waste water. The raiyats are also indifferent what quantity they use. Hence the duty includes the large superfluous quantity which runs on the field and re-enters the river. These remarks apply to the two Low Level Channels from Krishnarajasagara also as these channels command similar strips between them and the old lower channels. To assume that the modes of irrigation under the conditions mentioned above as the standard and the last word on duties in preparing a new and costly project which leads water to a very large expanse of open and fairly level country full of tanks and with facilities for economical use of water seems absurd. Yet it is such an assumption that is made in the criticisms of the scheme.

An instance that the above description is not exaggerated is furnished by the Kirangur Channel which is entirely a pick-up channel using waste water. It collects the waste of about 790 acres and irrigates 320 acres with no direct supplies and even then the resulting wastage entering the river is found to be nearly 50 per cent of the supply drawn off from the parent C. D. S. Channel originally and the actual duty works out to more than 47 acres per cusec in this case. It may be pointed out in this connection that in the paper referred to as having been read in 1910 at the Engineers' Association Meeting, the burden of the song is that the duties under the river channels are low and steps should be taken to stop waste and improve duty. The correspondent makes it appear as if it is affirmed in the paper that no higher duties than those realised under the existing channels is possible, which is not the case.

16. The duties realised under the tanks in the State are about 60 (which includes evaporation losses also) and seem to be as high as 80 under the Maddur Tank which is situated in the High Level Canal area.

The entire area to be operated upon by the High Level Canal is studded over with tanks. The land has comparatively flat slopes and the distance of the canal to the river Shimsha and the Cauvery the final drainage lines is very considerable. Even if the mode of cultivation of the raiyat should continue wasteful, which of course will be prevented as far as possible, such waste can be picked up or diverted by the numerous tanks in the locality or separate pick-up channels for being used again.

It may be pointed out that the tract commanded has various other facilities for securing high duties and economical use of water in other respects also. The Mysore Railway line cuts through the tract and the land on both sides of the line from Maddur to Yeliyur is commanded, as alse the lands on both sides of the Sivasamudram road from Maddur. The place is well served with roads, and there is spare labour population in the tract, now seeking work outside the locality and the demand for water is keen. The people are also not accustomed to the wasteful methods prevailing under the existing channels and control and regulation should be easy.

In these circumstances it is not at all impracticable to realise tank duties in the High Level Canal area.

17. It is proposed in the criticisms of the correspondent that the narrow strips of land obtained by extending the C. D. S. and Virajanadi channels which is exactly like the country under the existing channels should be arranged for irrigation instead of the High Level Canal area, and this suggestion if adopted is certain to lead to more than half the water stored being returned to the river without any benefit whatever to Mysore.

18. The High Level Canal command lies in Mandya, Malvalli and T.Narsipur Taluks. The correspondent's remarks about the soil in these tracts being saline and unfit is altogether exaggerated. The canal traces command nearly 300,000 acres of culturable land and there is ample margin for the selection of 120,000 acres. The saline lands lie mostly in Mandya Taluk and have been excluded. The remarks in the criticisms about fierce heat in the irrigated tract and greater loss by evaporation have no point. The tract in the Tanjore delta under the Metur Scheme in which case even higher duties than for the High Level Canal have been assumed, is not cooler than the High Level Canal area.

19. *Duties for Sugarcane.*—The duties dealt with above refer to rice. Sugarcane requires much less watering and not twice as much. The quantity of water required for this crop for one whole year is about equal to that taken by the rice crop in 6 months. Any one conversant with cultivation of cane, knows that one watering every two weeks would suffice and the practice under the existing channels is to allow water for 10 days in the month in the hot weather. Mr. Urgahalli Krishnaiengar whose experience of sugarcane cultivation is considerable has kindly furnished data showing that 85 inches of water in a whole year will suffice. The experience under Bannur Tank shows that even less may do. Translated into duties this means that one Mcft. is sufficient for $3\frac{1}{4}$ acres of sugarcane per annum. These are field duties; if 20 per cent transit losses are added the duty at the dam would work out to 2·7 acres per Mcft. per annum. This is equivalent to a duty of about less than 40 on the actual days of irrigation and this quantity is even too much. The figure given for duty in the original project is too low for sugarcane as the duty provided assumes that water is given every day of the year. It has to be modified according to actual conditions.

20. The facts as regards duties may be summarised as under:—

(*a*) The average actual duty for the whole season under the existing channels is from 27 to 30 including all losses in transit even with the existing very rough modes of regulation.

(*b*) The wastage is found to be enormous with this duty, but the country is unsuited for picking it up and reusing it except in a few places.

(*c*) The tank duties in the State including the High Level Canal tract is 60 including evaporation losses and hence the actual field duty may come to more than 80.

(*d*) That the standard of duties under the existing channels cannot be taken as applicable to the High Level Canal area and the experience of tanks in the locality commanded by the High Level Canal shows that it is reasonable to assume a duty of 70 eventually for paddy.

21. However as the duties assumed in the project are those intended to be worked up to eventually, the financial returns are indicated below with different duties including the low ones, and it will be found that the scheme will be remunerative enough under all conditions and very paying when fairly high duties are realised.

22. The quantities of water available every year for irrigation and power according to actual tables for the full storage showing the working of the reservoir from month to month are as under in an ordinary year. The reservoir will fill several times in a very good year and much more will be available in such years:—

(1) Irrigation	...	... 40,000 Mc ft.
(2) Power	...	... 7,000 ,,
(3) Evaporation	...	... 5,000 ,,

The reservoir is assumed to be operated only from about 76 level to 124 level in these tables.

23. Of the 40,000 Mcft. available for irrigation, 4,000 Mcft. will be earmarked for the two Low Level Canals and irrigation under the existing channels. The balance available for the High Level Canal is about 36,000 Mcft. The position stands thus in regard to the possibilities of irrigation under different duties and assumptions.

(*a*)

24. If it is assumed for the sake of argument that paddy of the highly aquatic variety now being cultivated under the Cauvery channels is the only crop that will be cultivated in the High Level Canal area and everything will be allowed to drift and large quantities of water will be allowed to go to waste, the area that would be irrigated at the average duty of 30

realised under the existing channels would be about 72,000 acres. If at least 33⅓ per cent increase over and above this area is added for extensions by improvement of duties, (as in the Madras Agreement for the existing channels), the area will be 96,000 acres. Let us ignore even this increase. On this assumption it will not be necessary to excavate canals for more than 72,000 acres. The cost of the Canal Scheme would then be about Rs. 180 lakhs only and including the cost of completing the dam the total cost would be Rs. 210 lakhs. As the total expenditure on the reservoir, irrigation and power is already highly remunerative it will be merely an acadamical point at this stage to consider how much of the expenditure should be debited to new irrigation. If at this stage, expenditure to be incurred hereafter is found remunerative in the near future it will more than justify taking up the irrigation scheme immediately. Assuming such low rates as Rs. 80 for contribution and Rs. 10 as average water rate the net expenditure and revenue would be Rs. 152·4 lakhs and 6·3 lakhs respectively, or a return of 4·1 per cent which is good for an irrigation scheme. It will be possible to keep down the cost still further if only this area alone is assumed as the estimated cost includes also several works for irrigating larger areas.

It may be pointed out in this connection that the return depends on the water rate assumed. The net yield from dry land is not ordinarily more than Rs. 10 per acre; whereas the net yield from paddy is at least Rs. 60 per acre although the average may be put down at even Rs. 75. The net increase in produce will be at least Rs. 50 per acre, if only paddy is cultivated. In the case of sugar-cane, the increased yield will be Rs. 100 to Rs. 300 or even more per acre against Rs. 50 for paddy. If Government chooses to fix the water rate so low as Rs. 10 per acre to benefit the raiyat and to encourage cultivation, the return though less to Government, is there, in the raiyats' pocket. That is the strongest point of an irrigation scheme.

(*b*)

If a duty of 50, which is less than tank duties is assumed and the crop irrigated is taken as all paddy, one Mcft. will irrigate 3⅓ acres and the area of paddy for which water available would suffice will be 120,000 acres. The cost of the Canal and of completing the dam would then be about Rs. 250 lakhs as recently estimated. The average contribution and average assessment being taken as Rs. 80 and Rs. 10 respectively, the net cost and the revenue would work out to Rs. 154 lakhs and 10·5 lakhs respectively, or a return of about 6·8 per cent after full development of irrigation although the average water rate assumed is Rs. 10 which is very low.

(*c*)

Now let us consider another alternative, *i.e.*, the irrigation of 40,000 acres of sugar-cane and 80,000 acres of paddy. Sugar-cane would require 15,000 Mcft. at 2·7 acres per Mcft. and the remaining 21,000 Mcft. can irrigate 70,000 acres of paddy at 50 duty or 84,000 acres at 60 duty. Thus the supply available seems quite adequate both for the perennial and monsoon irrigation provided in the scheme.

25. The correspondent makes out as if the proposals made involve the irrigation of more than 7 to 9 acres for a Mcft. From the above it will be seen that it is not the case. He assumes less quantity as available for impounding and empties the reservoir for various imagined purposes and manipulates duties in any way he likes.

26. If the scheme is viewed by combining the revenue for power and irrigation together, the return will be quite high at any stage including that of irrigation development.

27. The figures for distribution given above are merely illustrations. The question as to how the water available is to be distributed among different crops is engaging the attention of the Committee. But enough has been said to prove that the expenditure to be incurred will be remunerative enough under any conditions.

28. The figures given in the criticisms for estimates, indirect charges, returns, etc., are exaggerated and distorted. Financial results have been deduced by consideration of all legitimate charges direct and indirect.

The calculations of imaginary losses of crores of rupees in the criticisms afford amusing reading. No scheme including Metur or Sukkur Barrage or any large one requiring time for development will survive such charges as are being specially piled up on the Krishnaraja-sagara Scheme.

29. The main points may be summarised thus:—

(1) That the reservoir scheme was deliberately undertaken as a combined power and irrigation concern. It is an accepted principle of sound finance to utilise the revenue from temporary sources such as Gold Mining and power, etc., for capital works affecting the permanent interests of the country.

(2) To utilise fully the rights conferred by the agreement, energetic and immediate steps are necessary for the development of irrigation.

(3) Recent investigations have proved the High Level Canal Scheme to be a necessity for the development of the irrigation of 235,000 acres (not including 15,000 acres permissible under the existing channels) provided in the agreement as all other new channels possible in the Cauvery Valley together command less than 100,000 acres.

(4) That any other scheme except the High Level Canal would necessitate the irrigation of narrow strips of land hugging the river where only low duties are practicable. The Taluks of Mandya and Malvalli are subject to chronic drought and any other scheme except the High Level Canal would not benefit that tract.

(5) It is the definite opinion of the Krishnarajasagara Special Committee of 1921 that the North Bank High Level Canal is the only scheme that can be recommended for development of irrigation on an extensive scale below the reservoir in the tract of country liable to chronic drought. They are also strongly of opinion that in view of the remunerative nature of the undertaking, of the immense benefit to the raiyats and of the general economic development of the State resulting from the proposed extension of irrigation in the tracts which are badly in need of it, the High Level Canal should be taken up as early as possible.

(6) Another important advantage of the High Level Canal scheme is that after the construction of the Kabbini Reservoir Mysore is entitled to the irrigation under the High Level Canal may be extended up to about 170,000 acres by the joint regulation of the two reservoirs for passing down Madras supplies, the water for power being drawn from the Kabbini Reservoir.

(7) That the proposal of the Press Correspondent if adopted would result in more than half the reservoir being emptied into the river, thus undoing the possible benefits of the reservoir to Mysore to a very great extent. This is a very important point to note.

(8) That the area commanded by the High Level Canal is specially suited for realising high duties.

(9) That the weight of professional opinion is in favour of the duties provided in the scheme.

(10) Even assuming the worst conditions and the low duties and low rates of assessment and contribution given in the 1921 Special Committee's report, the scheme is likely to yield a fair return in the near future with every probability of bringing in a handsome return in the long run.

(11) The combined scheme will be quite remunerative at any stage.

(12) The scheme is full of potentialities for the good of the country and it will be criminal not to exploit it fully.

(13) Finally it is not intended to take up all the channels provided in the estimate for 120,000 acres of irrigation and excavate them in advance. The construction of the Canals beyond the tunnel costing nearly Rs. 92 lakhs will be proceeded with gradually branch after branch after watching irrigation development under the portions excavated.

30. It is hoped now that the explanation given will remove any misgivings that may have been created by the obviously uninformed criticisms.

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